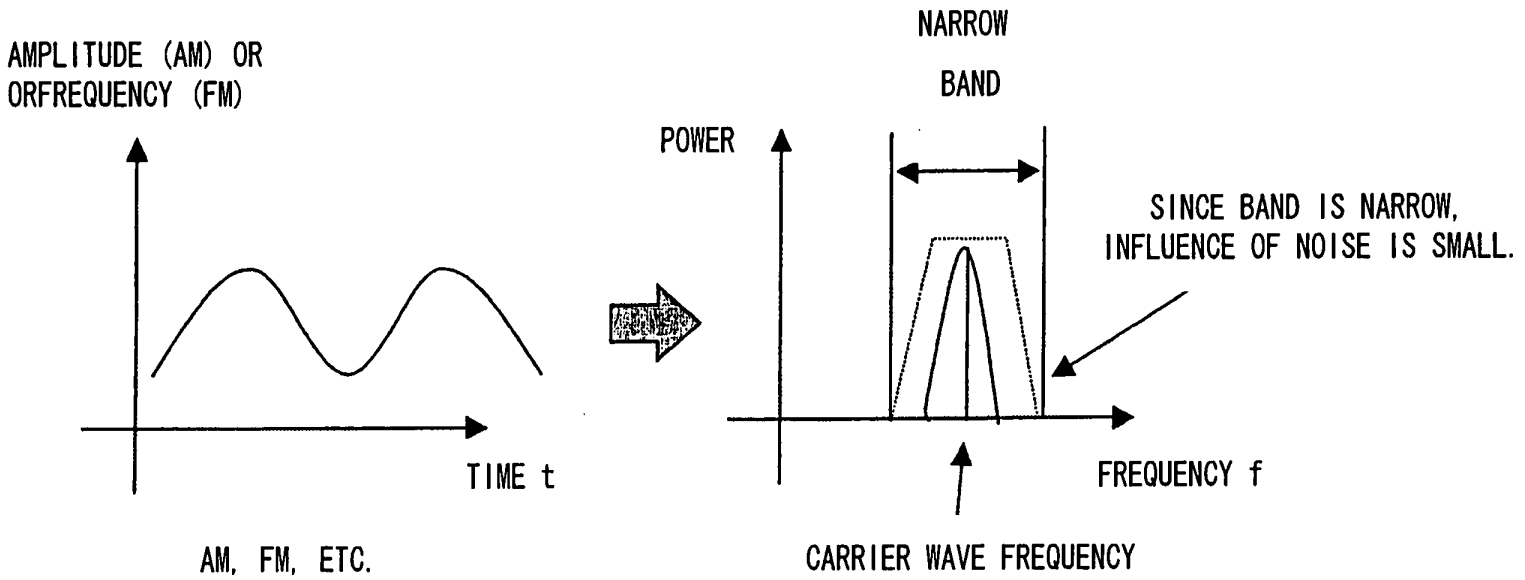

AMPLITUDE (AM) OR
ORFREQUENCY (FM)
TIME t
AM, FM, ETC.
NARROW
BAND
POWER
SINCE BAND IS NARROW,
INFLUENCE OF NOISE IS SMALL.
FREQUENCY f
CARRIER WAVE FREQUENCY

FIG. 1

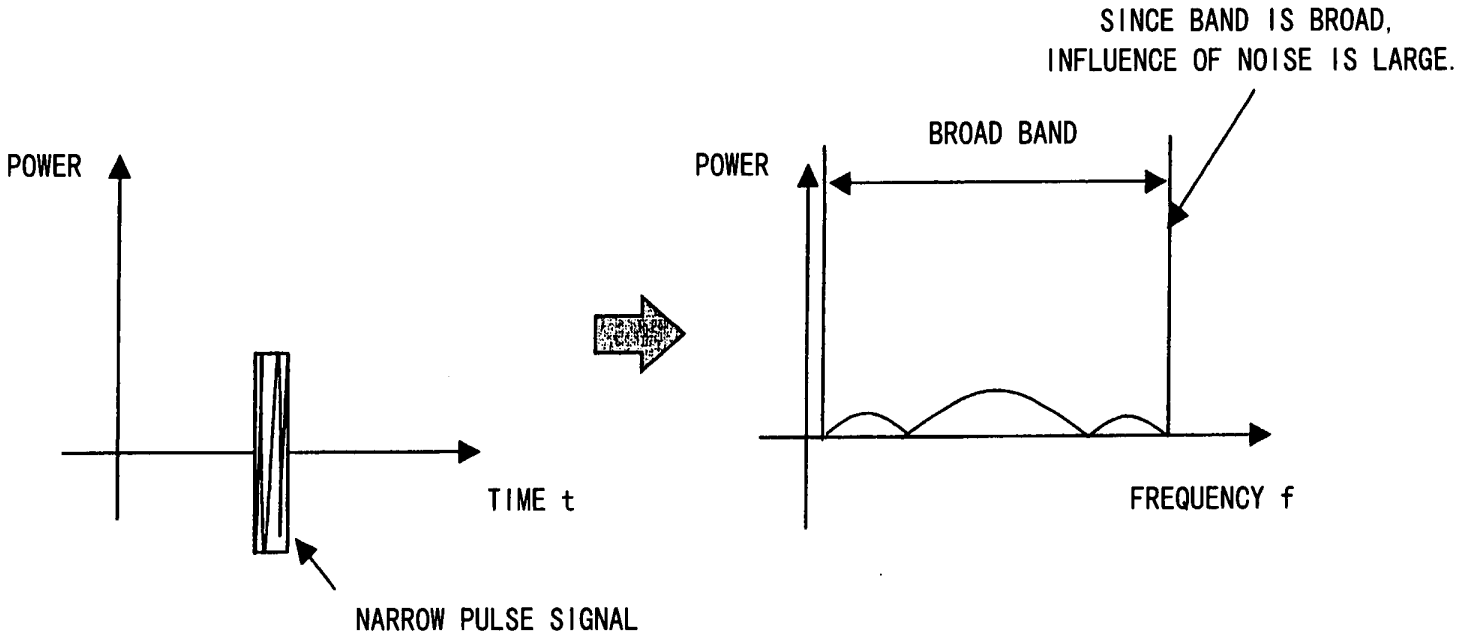

SINCE BAND IS BROAD,
INFLUENCE OF NOISE IS LARGE.
BROAD BAND
POWER
POWER
TIME t
FREQUENCY f
NARROW PULSE SIGNAL

FIG. 2

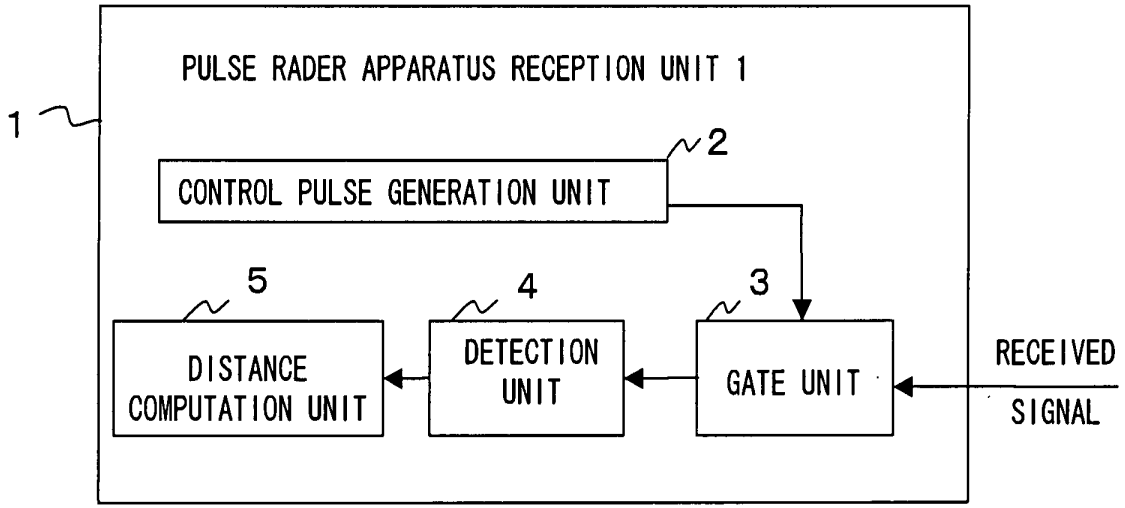

PULSE RADER APPARATUS RECEPTION UNIT 1
1
2
CONTROL PULSE GENERATION UNIT
5
4
3
DISTANCE COMPUTATION UNIT
DETECTION UNIT
GATE UNIT
RECEIVED SIGNAL

FIG. 3

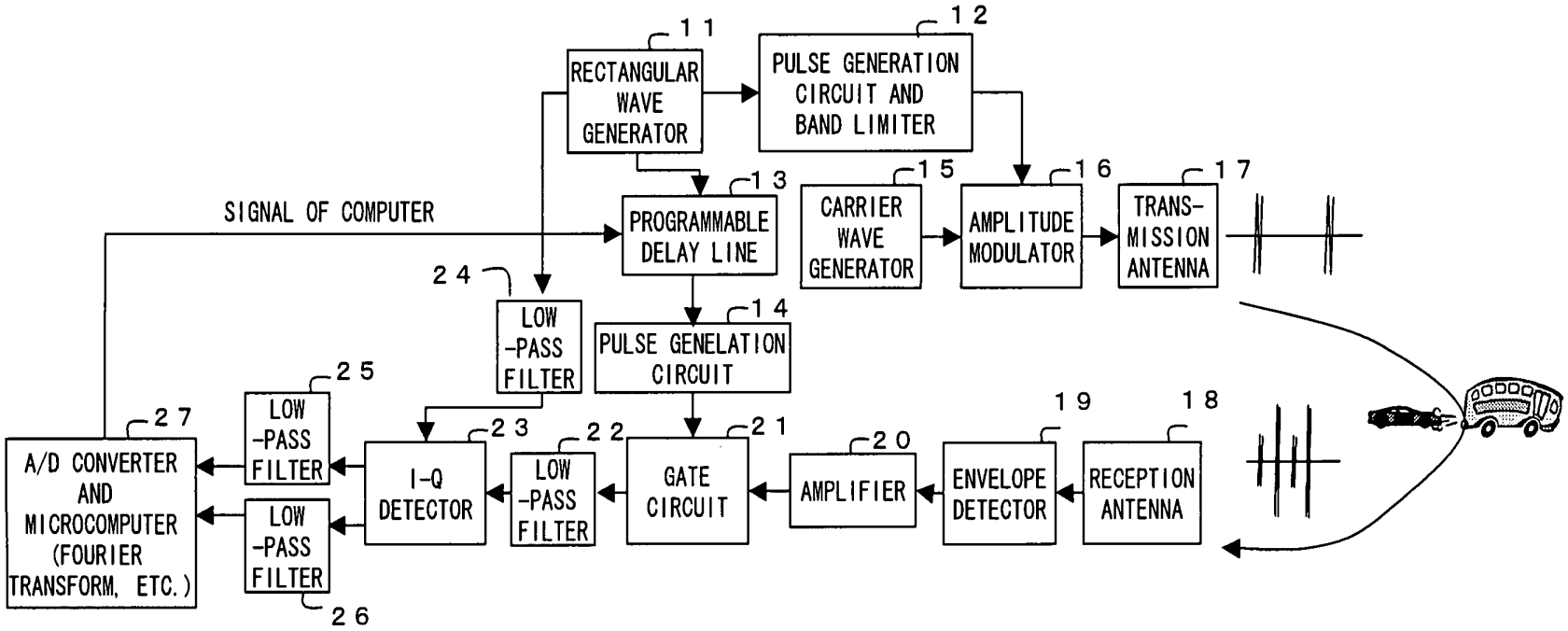

11
RECTANGULAR WAVE GENERATOR
12
PULSE GENERATION CIRCUIT AND BAND LIMITER
SIGNAL OF COMPUTER
13
PROGRAMMABLE DELAY LINE
15
CARRIER WAVE GENERATOR
16
AMPLITUDE MODULATOR
17
TRANS-MISSION ANTENNA
24
LOW -PASS FILTER
14
PULSE GENELATION CIRCUIT
25
LOW -PASS FILTER
27
A/D CONVERTER AND MICROCOMPUTER (FOURIER TRANSFORM, ETC.)
23
I-Q DETECTOR
22
LOW -PASS FILTER
21
GATE CIRCUIT
20
AMPLIFIER
19
ENVELOPE DETECTOR
18
RECEPTION ANTENNA
26
LOW -PASS FILTER

FIG. 4

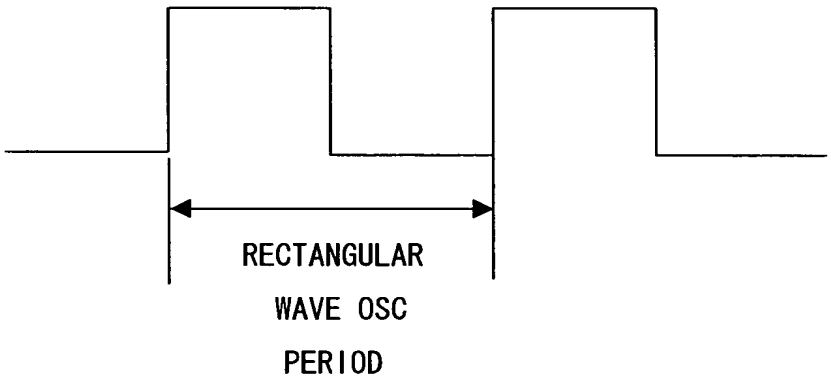



FIG. 5

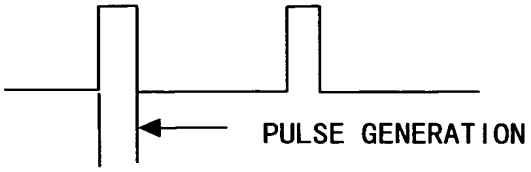



FIG. 6A

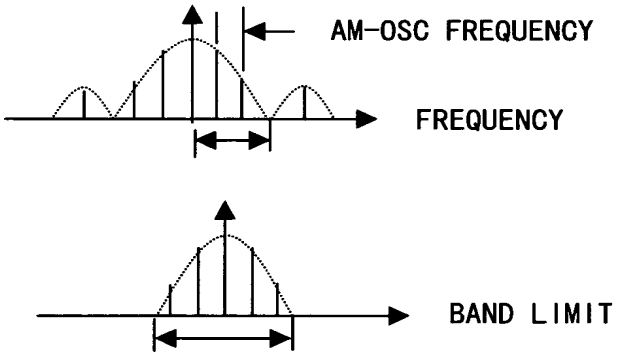



FIG. 6B

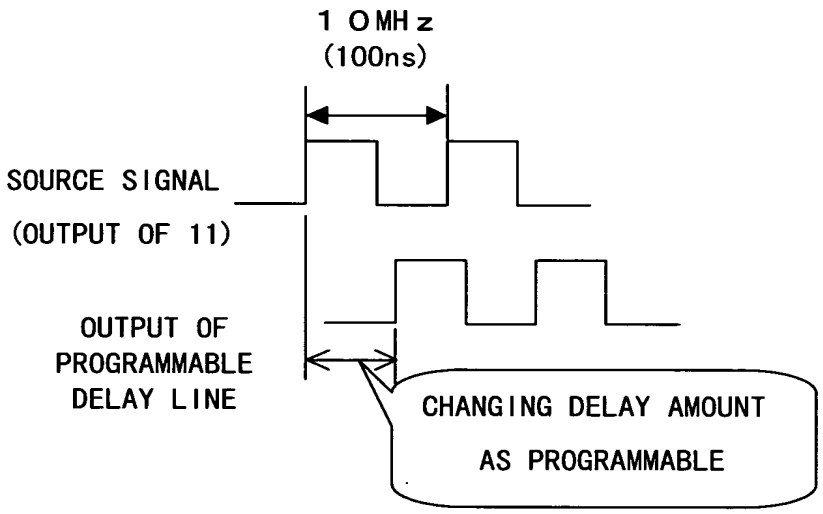

10MHz
(100ns)
SOURCE SIGNAL
(OUTPUT OF 11)
OUTPUT OF
PROGRAMMABLE
DELAY LINE
CHANGING DELAY AMOUNT
AS PROGRAMMABLE

FIG. 7

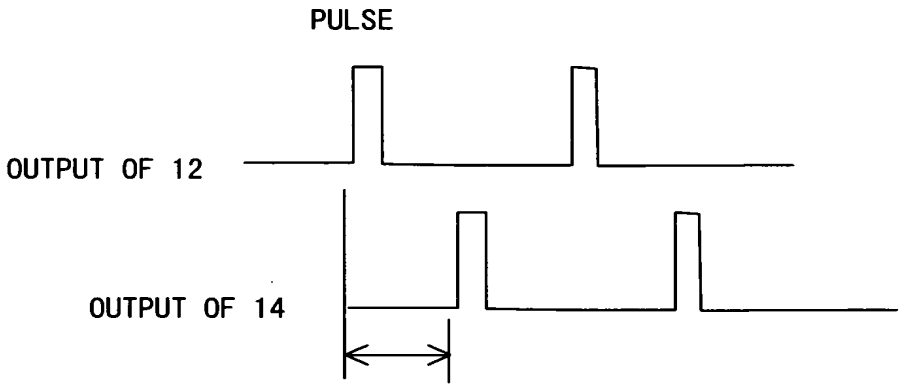



FIG. 8

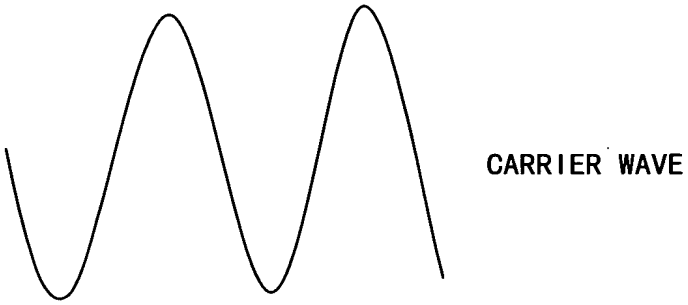



FIG. 9A

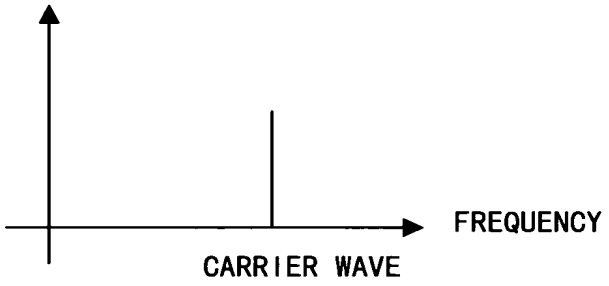



FIG. 9B

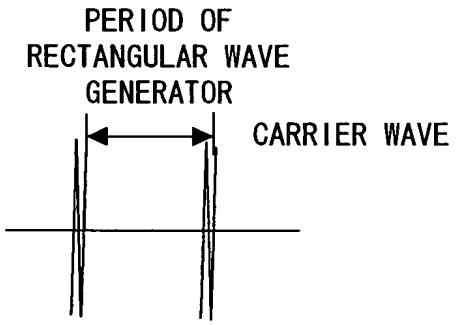



FIG. 10A

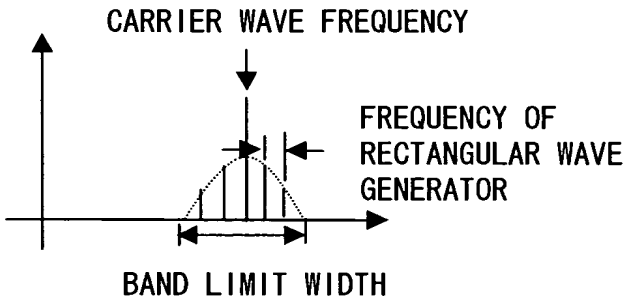



FIG. 10B

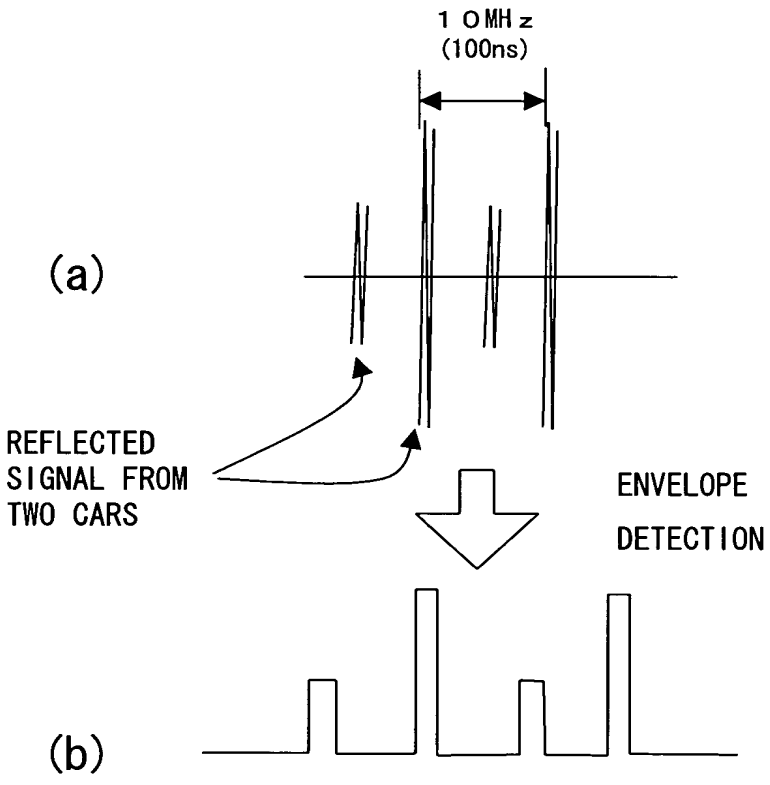

10MHz
(100ns)
(a)
REFLECTED
SIGNAL FROM
TWO CARS
ENVELOPE
DETECTION
(b)

FIG. 11

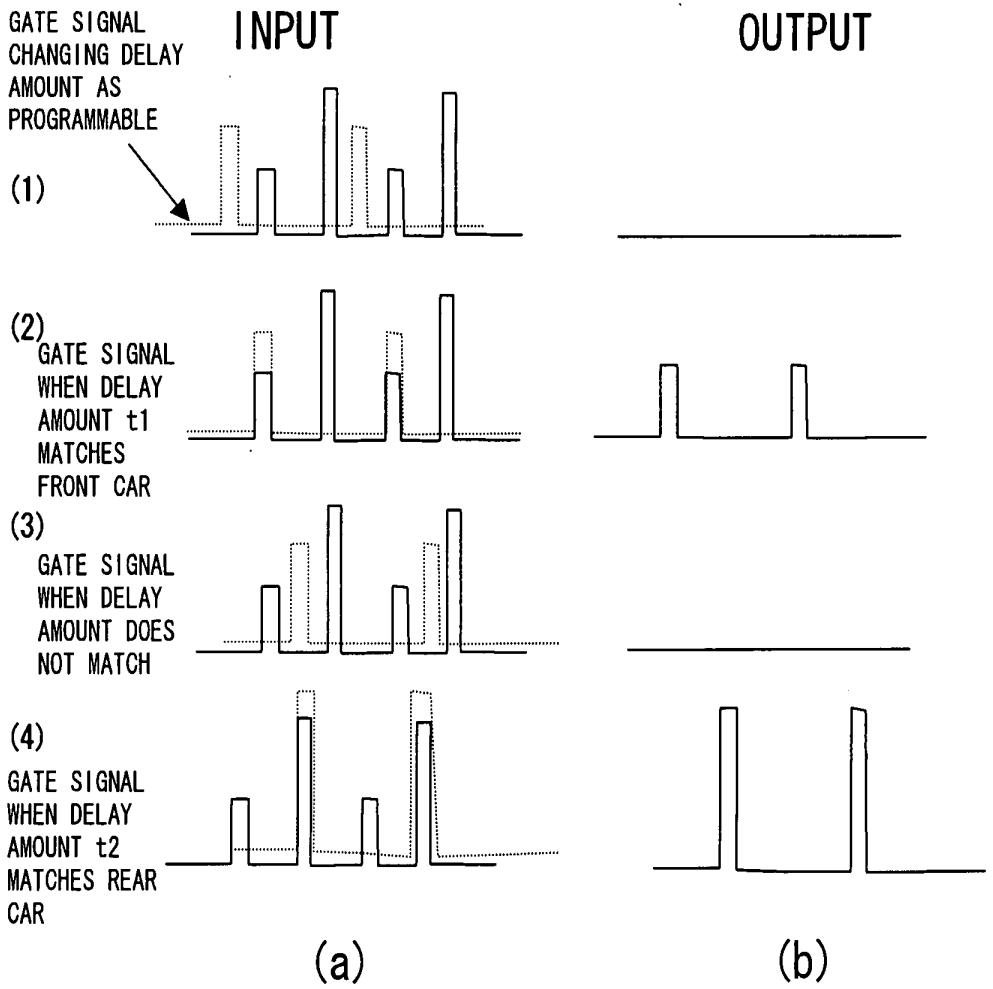

GATE SIGNAL CHANGING DELAY AMOUNT AS PROGRAMMABLE
INPUT
OUTPUT
(1)
(2)
GATE SIGNAL WHEN DELAY AMOUNT t1 MATCHES FRONT CAR
(3)
GATE SIGNAL WHEN DELAY AMOUNT DOES NOT MATCH
(4)
GATE SIGNAL WHEN DELAY AMOUNT t2 MATCHES REAR CAR
(a)
(b)

FIG. 12

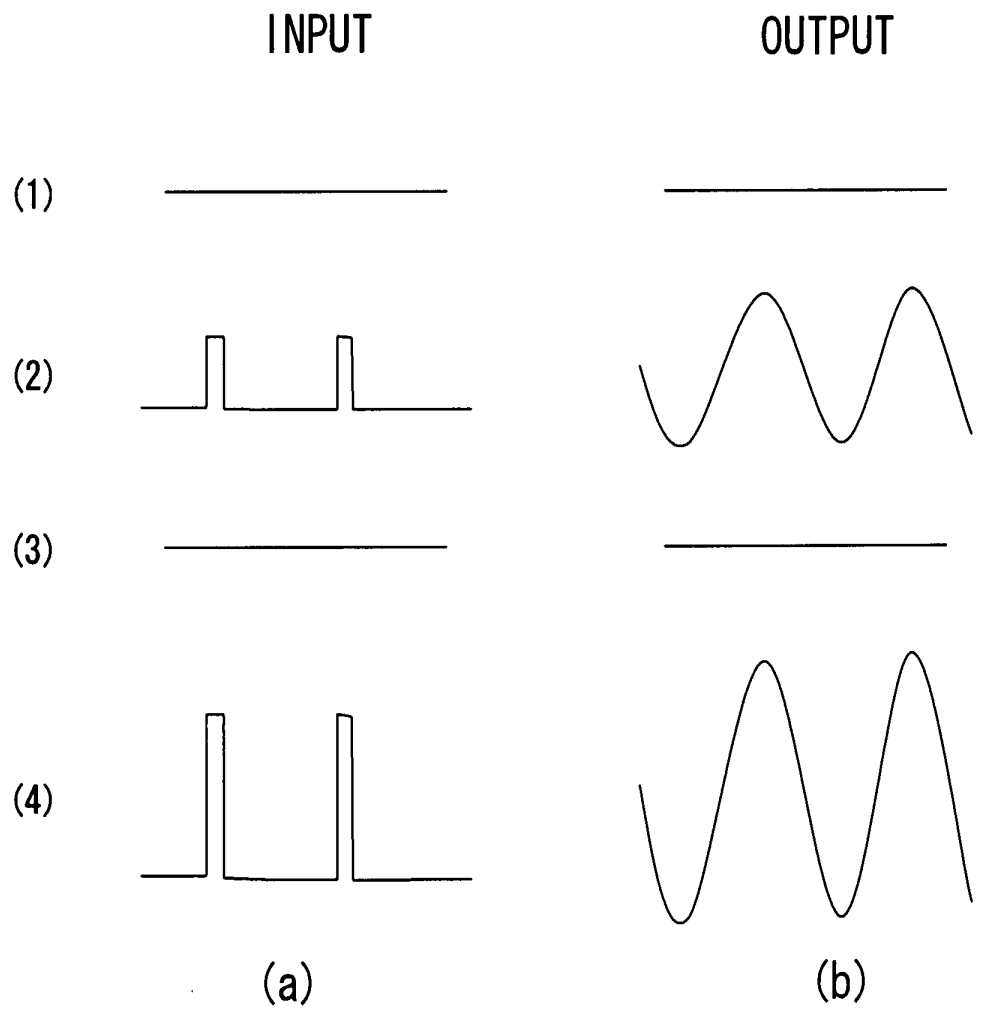



FIG. 13

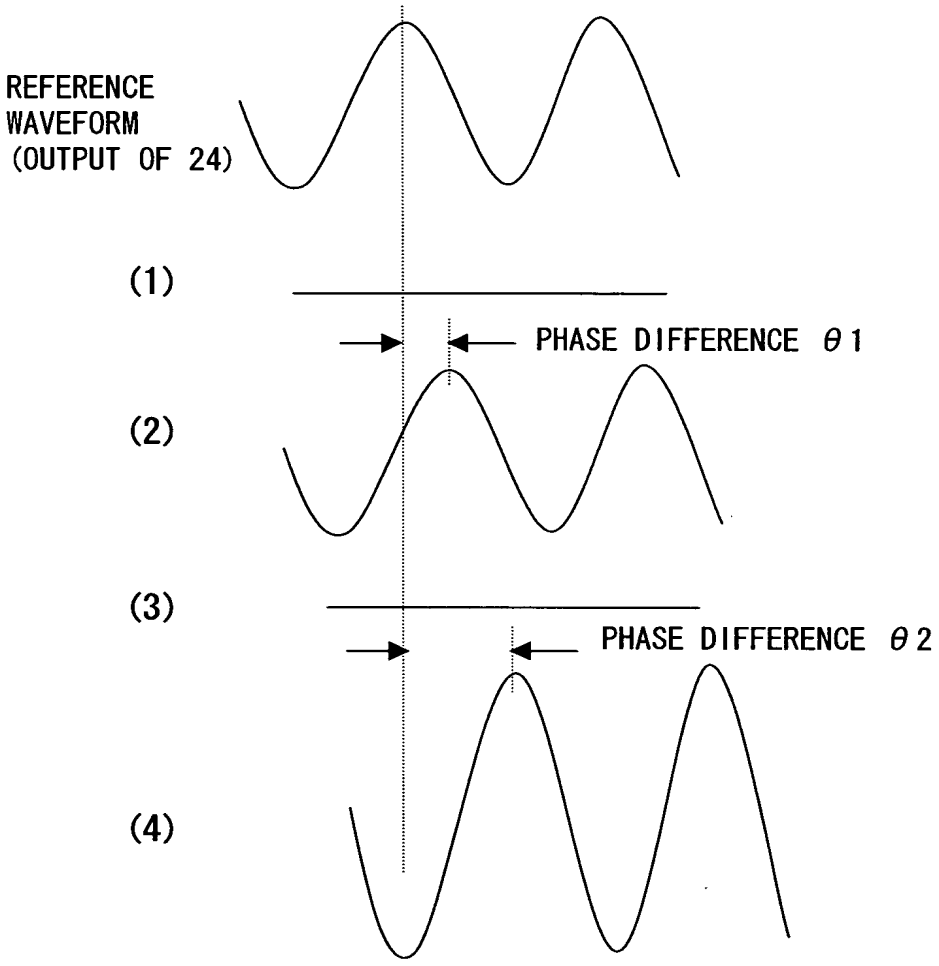

REFERENCE
WAVEFORM
(OUTPUT OF 24)
(1)
PHASE DIFFERENCE θ1
(2)
(3)
PHASE DIFFERENCE θ2
(4)

FIG. 14

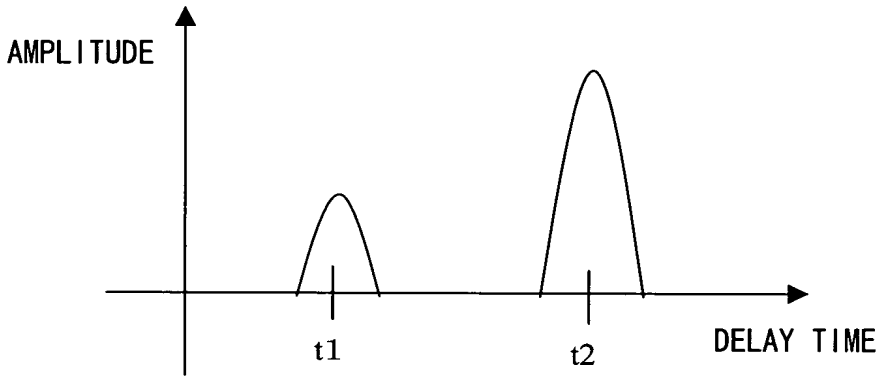



FIG. 15

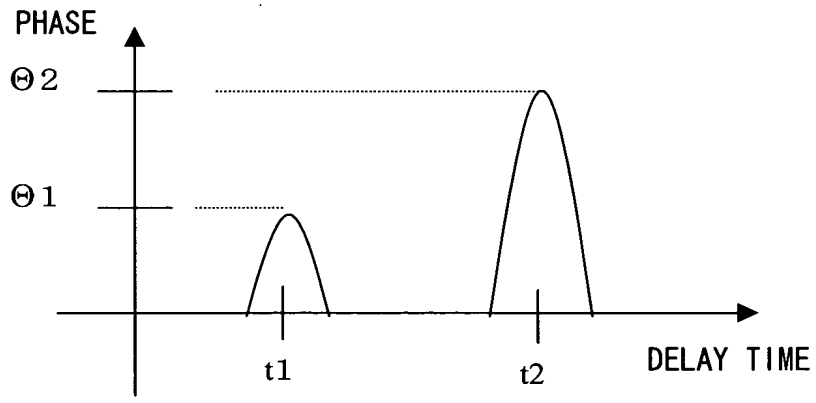



FIG. 16

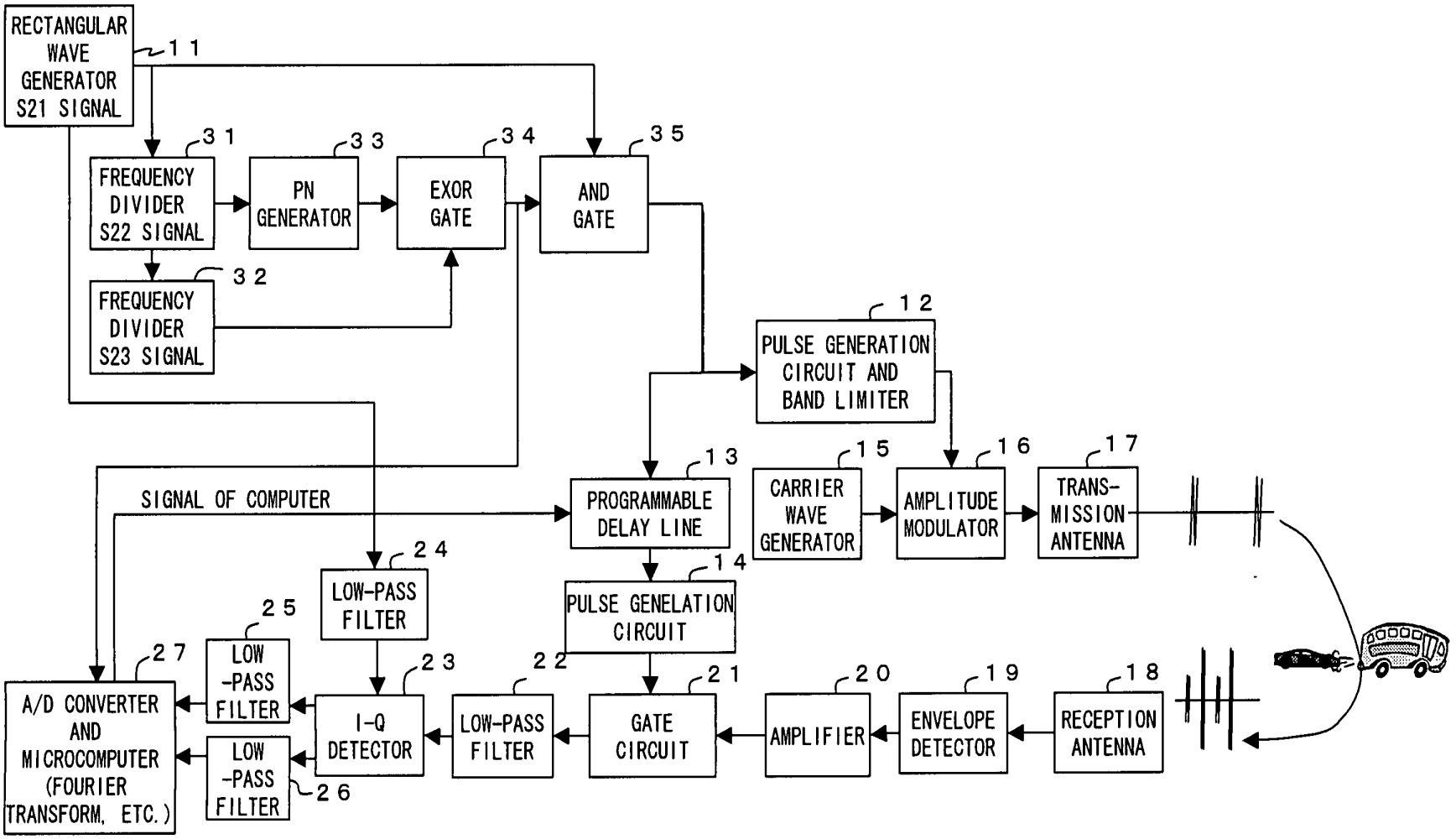

RECTANGULAR WAVE GENERATOR S21 SIGNAL
11
FREQUENCY DIVIDER S22 SIGNAL
31
PN GENERATOR
33
EXOR GATE
34
AND GATE
35
FREQUENCY DIVIDER S23 SIGNAL
32
PULSE GENERATION CIRCUIT AND BAND LIMITER
12
SIGNAL OF COMPUTER
PROGRAMMABLE DELAY LINE
13
CARRIER WAVE GENERATOR
15
AMPLITUDE MODULATOR
16
TRANS-MISSION ANTENNA
17
LOW-PASS FILTER
24
PULSE GENELATION CIRCUIT
14
LOW -PASS FILTER
25
A/D CONVERTER AND MICROCOMPUTER (FOURIER TRANSFORM, ETC.)
27
I-Q DETECTOR
23
LOW-PASS FILTER
22
GATE CIRCUIT
21
AMPLIFIER
20
ENVELOPE DETECTOR
19
RECEPTION ANTENNA
18
LOW -PASS FILTER
26

FIG. 17

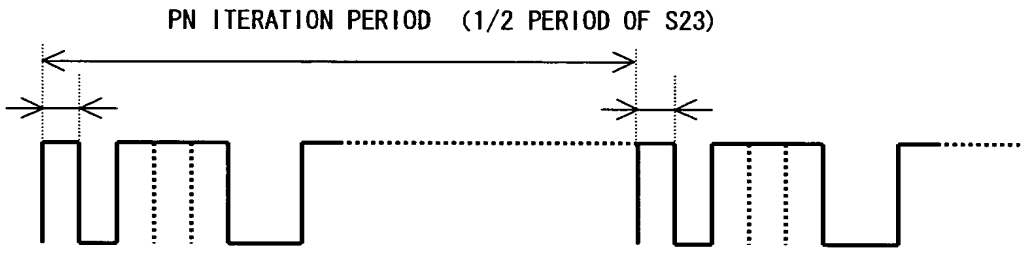



FIG. 18

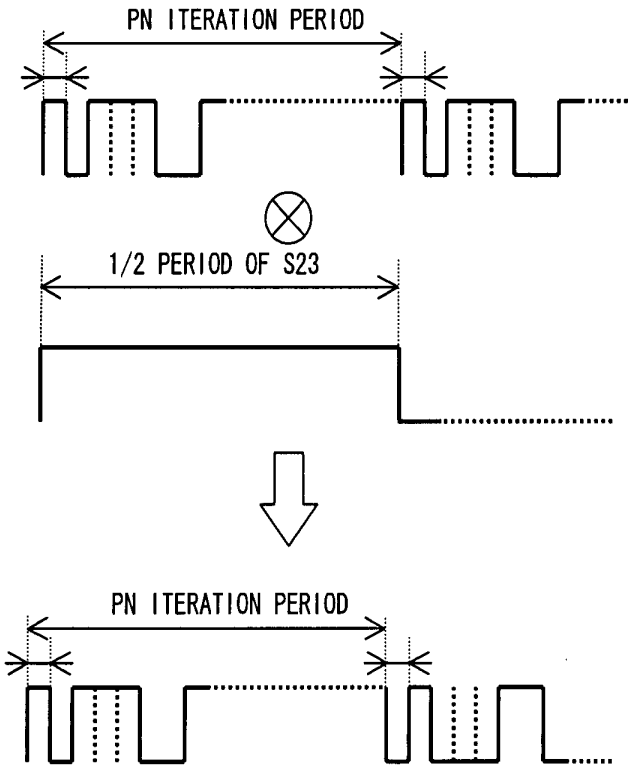



FIG. 19A

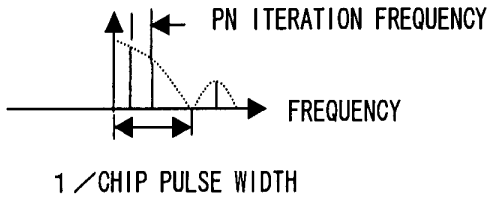



FIG. 19B

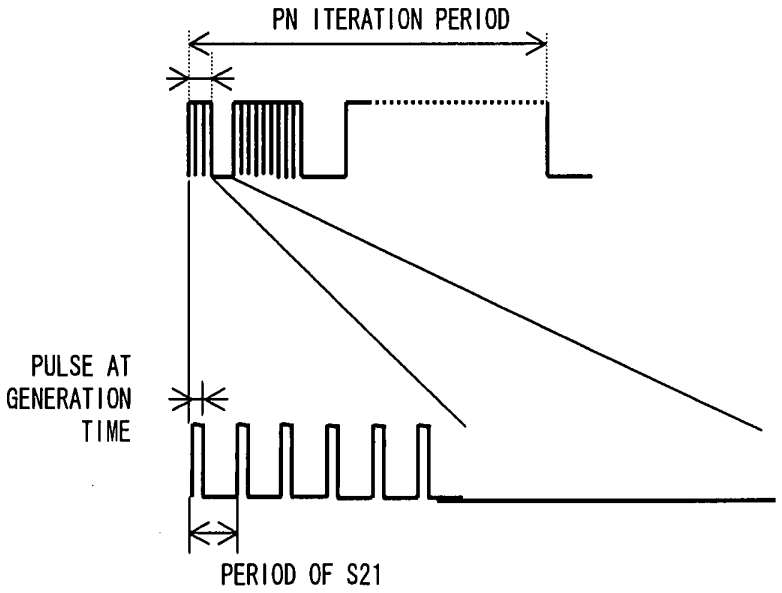



FIG. 20A

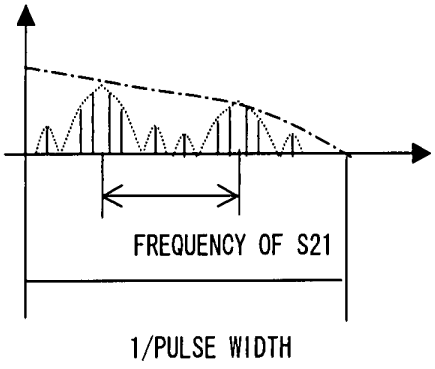



FIG. 20B

FIG. 21

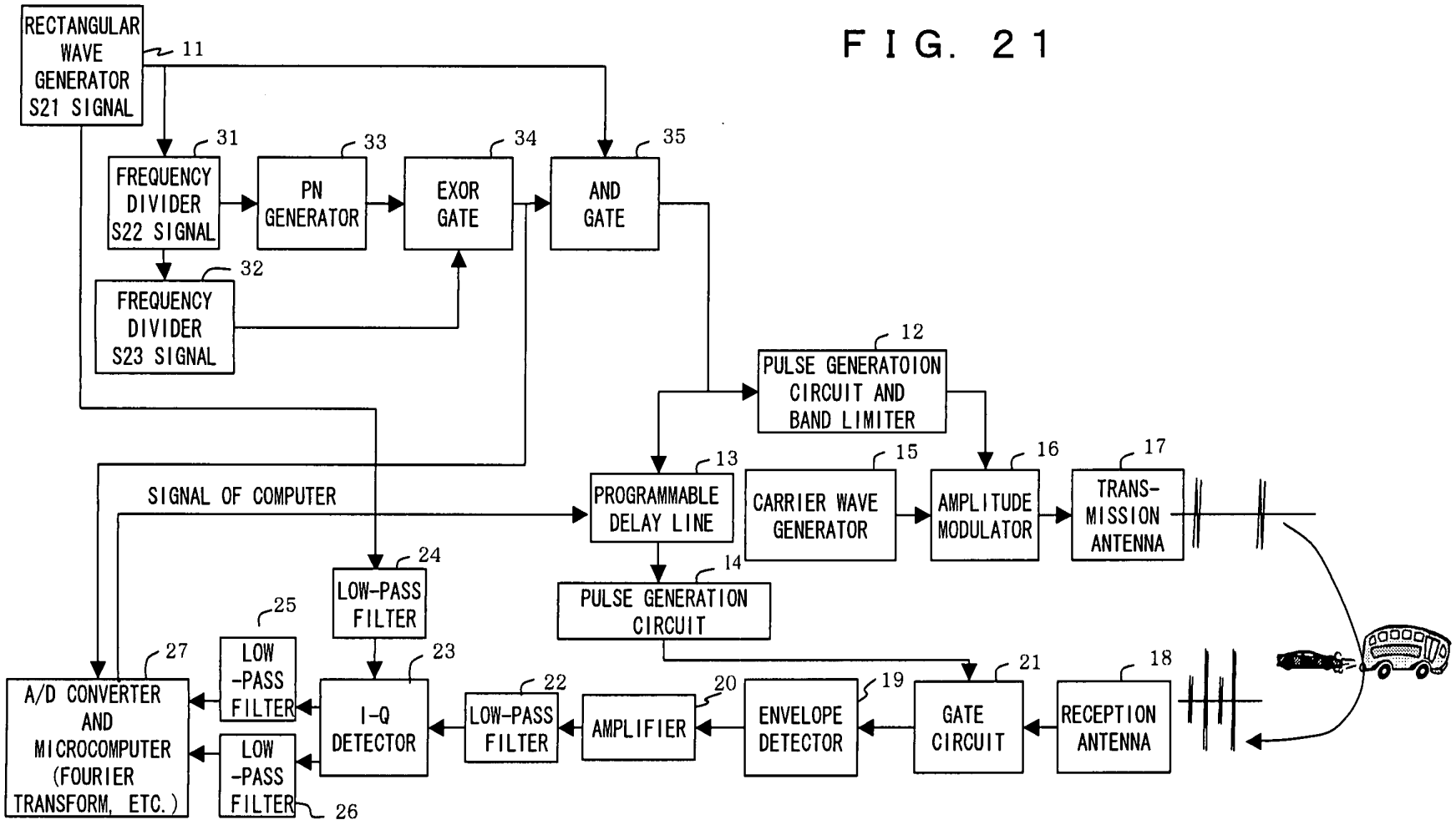
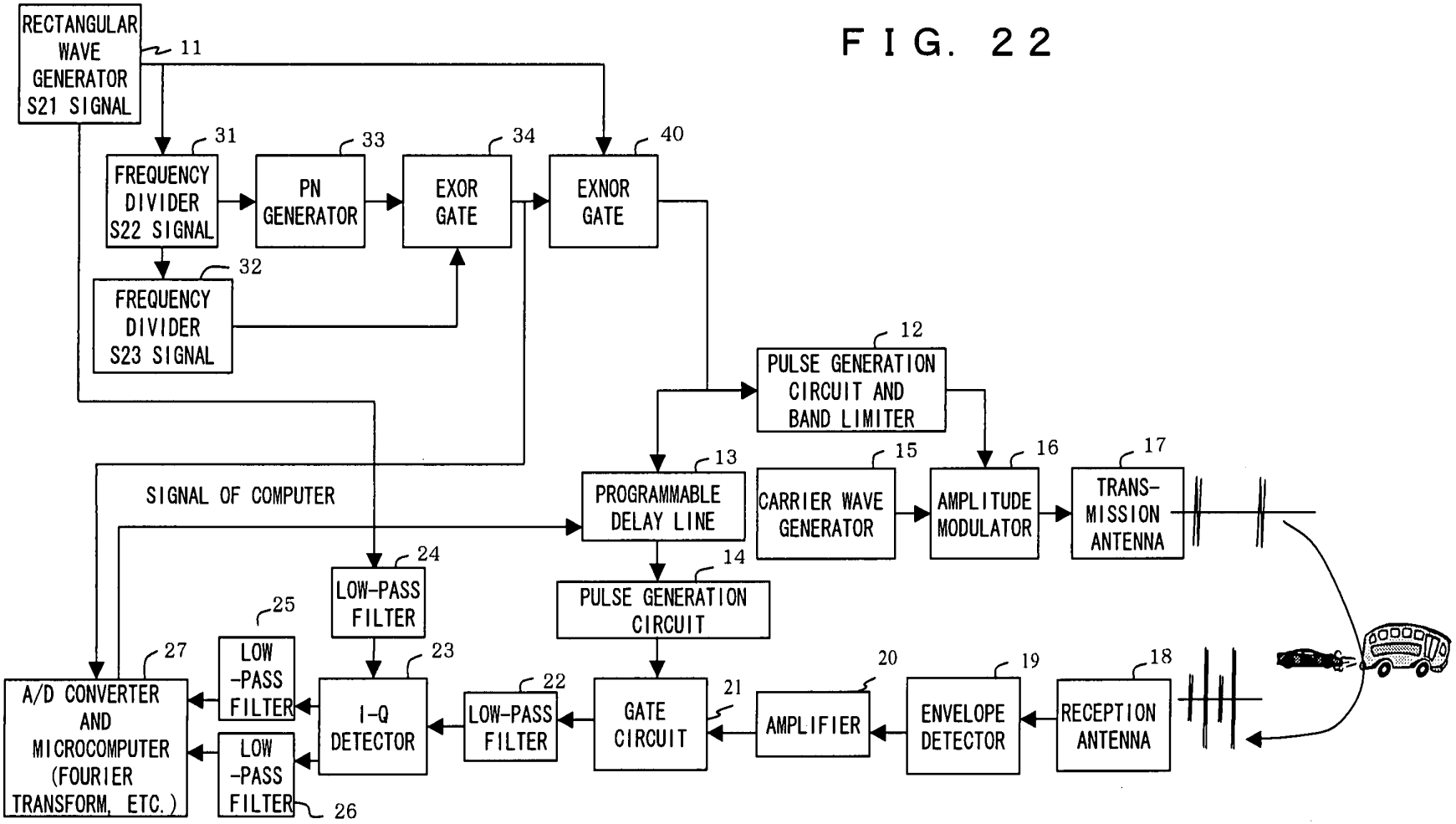

RECTANGULAR WAVE GENERATOR S21 SIGNAL
11
FREQUENCY DIVIDER S22 SIGNAL
31
PN GENERATOR
33
EXOR GATE
34
AND GATE
35
FREQUENCY DIVIDER S23 SIGNAL
32
PULSE GENERATOION CIRCUIT AND BAND LIMITER
12
SIGNAL OF COMPUTER
PROGRAMMABLE DELAY LINE
13
CARRIER WAVE GENERATOR
15
AMPLITUDE MODULATOR
16
TRANS-MISSION ANTENNA
17
LOW-PASS FILTER
24
PULSE GENERATION CIRCUIT
14
LOW -PASS FILTER
25
A/D CONVERTER AND MICROCOMPUTER (FOURIER TRANSFORM, ETC.)
27
I-Q DETECTOR
23
LOW-PASS FILTER
22
AMPLIFIER
20
ENVELOPE DETECTOR
19
GATE CIRCUIT
21
RECEPTION ANTENNA
18
LOW -PASS FILTER
26

FIG. 22


RECTANGULAR WAVE GENERATOR S21 SIGNAL
11
FREQUENCY DIVIDER S22 SIGNAL
31
PN GENERATOR
33
EXOR GATE
34
EXNOR GATE
40
FREQUENCY DIVIDER S23 SIGNAL
32
PULSE GENERATION CIRCUIT AND BAND LIMITER
12
SIGNAL OF COMPUTER
PROGRAMMABLE DELAY LINE
13
CARRIER WAVE GENERATOR
15
AMPLITUDE MODULATOR
16
TRANS-MISSION ANTENNA
17
LOW-PASS FILTER
24
PULSE GENERATION CIRCUIT
14
LOW -PASS FILTER
25
A/D CONVERTER AND MICROCOMPUTER (FOURIER TRANSFORM, ETC.)
27
I-Q DETECTOR
23
LOW-PASS FILTER
22
GATE CIRCUIT
21
AMPLIFIER
20
ENVELOPE DETECTOR
19
RECEPTION ANTENNA
18
LOW -PASS FILTER
26

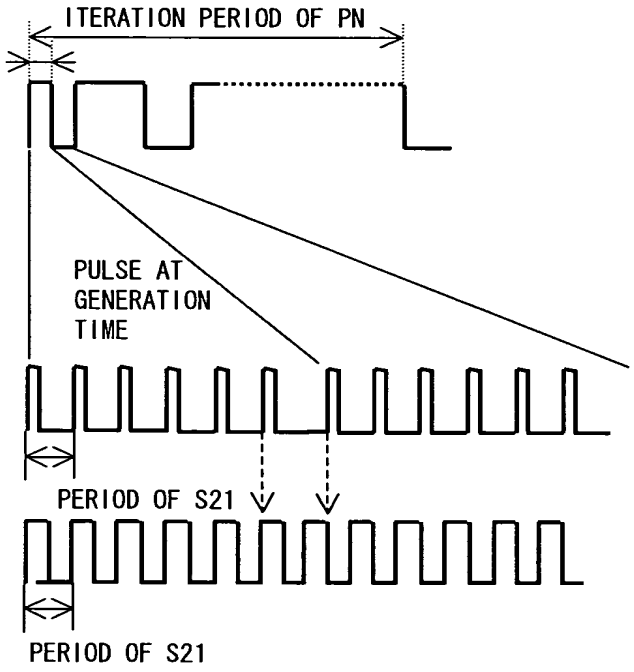

ITERATION PERIOD OF PN
PULSE AT GENERATION TIME
PERIOD OF S21
PERIOD OF S21

FIG. 23

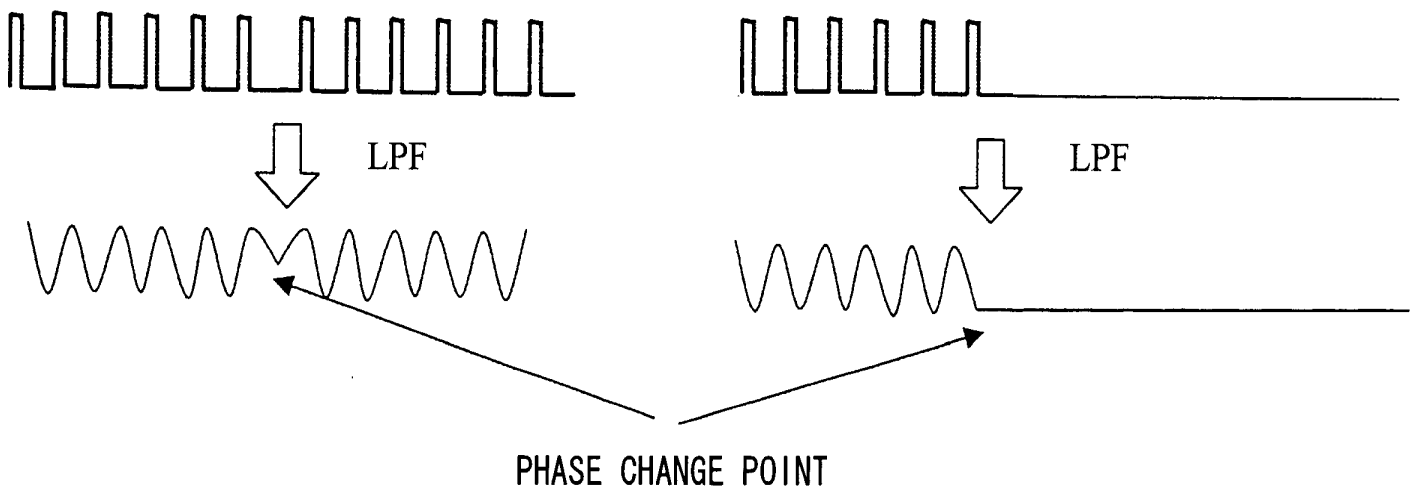



FIG. 24

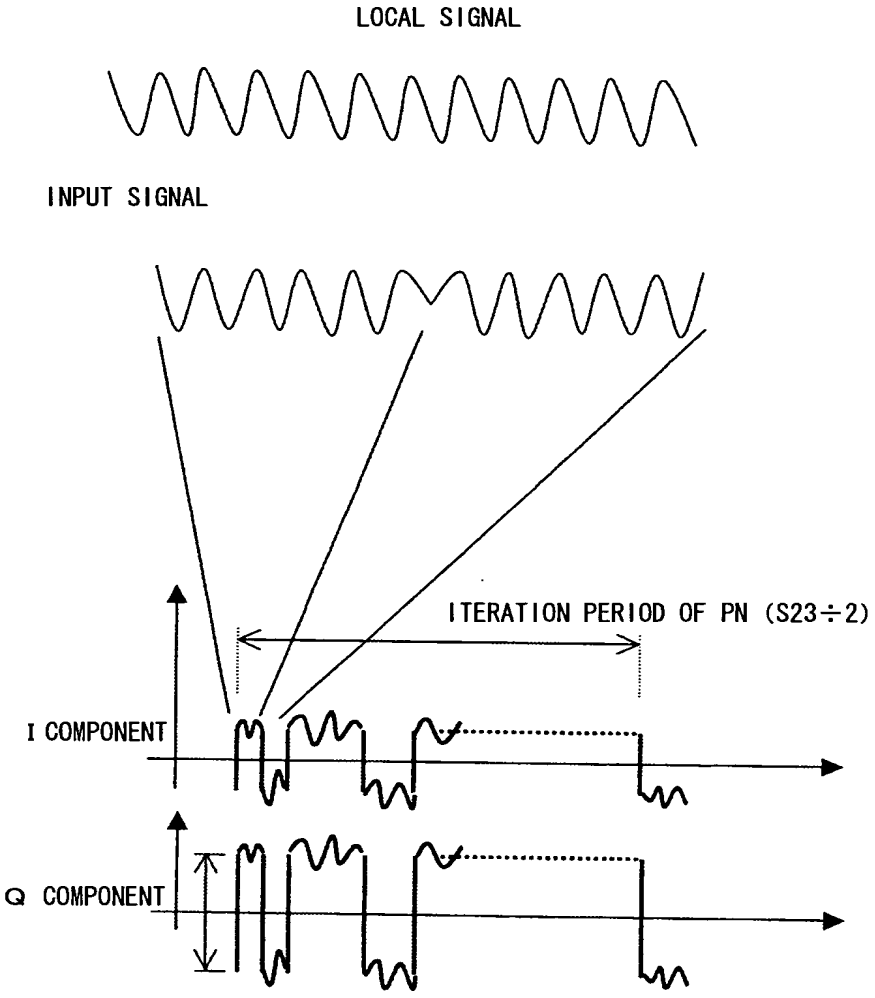

LOCAL SIGNAL
INPUT SIGNAL
ITERATION PERIOD OF PN (S23÷2)
I COMPONENT
Q COMPONENT

FIG. 25

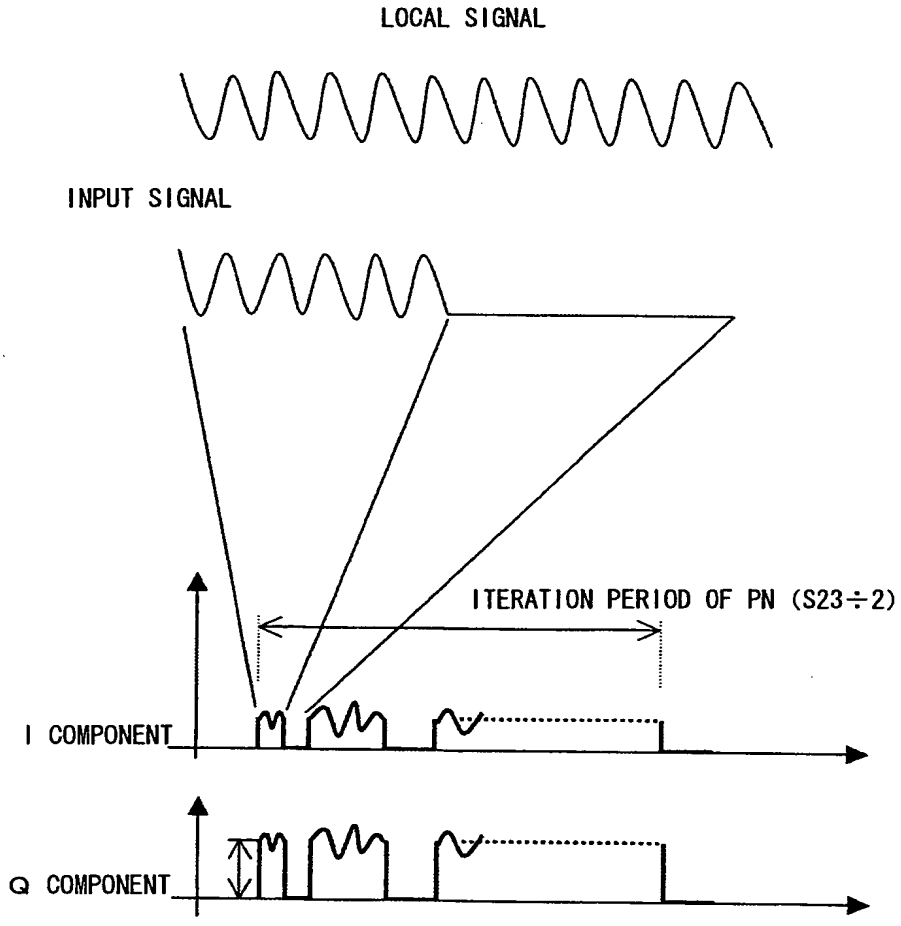

LOCAL SIGNAL
INPUT SIGNAL
ITERATION PERIOD OF PN (S23÷2)
I COMPONENT
Q COMPONENT

FIG. 26